

MANUAL AND PARTS LIST

BEHLMAN OSCILLATOR MODEL

OSC-1-45/2000-E

SERIAL #17406



Electronic Energy Conversion Sources & Systems

WARRANTY

Behlman Engineering, hereinafter referred to as BE, products are warranted against defects in materials and workmanship, and BE agrees to repair or replace any product that fails to perform as specified within one year of date of shipment when returned to BE with transportation prepaid by the buyer. This warranty shall not apply to any product that has been:

1. Connected, installed, adjusted or used otherwise than in accordance with the instructions furnished by BE.
2. Subject to misuse, negligence, or accident.
3. Repaired, worked on, or altered by person(s) unauthorized by BE in such manner as to injure, in BE's sole judgement, the performance, stability, or reliability of the product.

No other warranty is expressed or implied. BE is not liable for consequential damages, for failures of delivery in whole or in part, or injuries resulting from its use, or for any other cause.

BE's sole liabilities, and buyer's sole remedies, under this agreement, shall be limited to a refund of the purchase price, or at BE's sole discretion, to the repair or replacement of the product that proves, upon BE's examination, to be defective.

Behlman Engineering
100 Mark Avenue, Carpinteria, California 93014
Telephone Number (805) 484-2177



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CLAIM FOR DAMAGE IN SHIPMENT

Under the FOB factory terms of sale, ownership and responsibility are transferred to the customer when the equipment leaves the factory. Each Behlman instrument is shipped from the factory in proper operating condition.

Immediately upon receiving the instrument, unpack and inspect it for evidence of damage incurred in shipment. Unless the equipment has been extensively damaged and is obviously inoperable, check its operation. File a claim with the freight carrier if the equipment has been damaged in any way or if it fails to operate properly. Forward a copy of the damage claim report to Behlman Engineering. Include the model number, serial number and date the shipment was received. Behlman Engineering will advise the disposition of the equipment and will arrange for the necessary repair or replacement.

RETURNING EQUIPMENT TO FACTORY

This equipment, like all precision electronic equipment, is susceptible to shipping damage. It contains heavy magnetic components as well as delicate electronic components. For this reason, it is advantageous to effect repairs through the local service representative whenever possible.

Do not return equipment to the factory without prior authorization from Behlman Engineering.

If equipment is returned to the factory without prior authorization the customer is liable for all shipping, handling and repair costs.

When packaging for re-shipment, use adequate shock-absorbent material within shipping container to preclude damage to the equipment.

Behlman Engineering
1142 Mark Avenue, Carpinteria, California, 93013
Telephone number: (805) 684-8311

1.2.2 SPECIFICATIONS-OSCILLATOR

MODEL OSC-1-45/2000-E

FREQUENCY:

45 to 2000 Hz in four bands.

Band A: 45-150 Hz.

Band Ax2: 90-300 Hz.

Band B: 300-1000 Hz.

Band Bx2: 600-2000 Hz.

ACCURACY:

$\pm 1.0\%$

OUTPUT:

0-9.2 Vac, single phase. (Drives amplifier from zero to maximum output voltage.)

FREQUENCY DISPLAY:

Calibrated dial.

4.2 OSCILLATOR

The oscillator generates the variable amplitude signal/s used to drive the power amplifier to the desired output voltage. Oscillators are available in either fixed or variable frequency models.

The oscillator is a Phase shift design using a quad operational amplifier. Two of the four sections are used as unity gain 120° phase shifters. (90° on 2 $\emptyset$ oscillators.) One section is employed as a variable-gain amplifier having a nominal gain of unity. The fourth section compares a positive voltage, obtained by rectifying the A.C. output of the variable-gain amplifier, to a positive voltage determined by the setting of the ten-turn voltage-adjust potentiometer. Differences between these two voltages are amplified and applied to the gate of a Field Effect Transistor (FET) used in the voltage- controlled variable-resistance mode. The FET controls the negative feedback of the variable-gain amplifier in such a way as to oppose changes in the amplitude of its output.

The variable-gain amplifier generates the output signal on single-phase oscillators, and the A $\emptyset$ signal on two and three phase oscillators. This signal also goes to the input of the first 120° (90°) phase shifter. The output of this phase shifter provides the B $\emptyset$ signal on two and three phase oscillators and also goes to the input of the second 120° (90°) phase shifter. The output of this phase shifter provides the C $\emptyset$ signal on three-phase oscillators.

A resistance bridge is used between the B $\emptyset$ and C $\emptyset$ signals to provide positive feedback for the input of the variable-gain amplifier, thus sustaining oscillations.

On variable frequency oscillators a dual-ganged potentiometer is used to vary the resistance legs of the RC frequency determining networks.

4.2.1 EXTERNAL SYNC OPTION

This option allows phase synchronization of the oscillator output signal with an externally applied signal. The sync signal should be approximately 3 Vrms and within $\pm 1\%$ of the oscillator frequency.

SCHEMATICS AND PART LISTS

OSCILLATOR P/C BOARD ASSEMBLY 16-148/A
NO. B-1324/A

OSC
AMP
OUT
DRI
E0B

P1

1 E0B
2 OUT
3 DRI
4 E0A
5 GND
6 E0C
7 -16 VDC
8 +16 VDC

J1

1
2
3
4
5 E0B
6 B0
7 E0C
8
9 -16
10
11 GND
12 E0A
13 A0
14 V/A
15 SYNC
16
17
18
19
20
21
22

+16

R2A
R2B
CW

FREQ. ADJUST

R1
CCW

VOLTS ADJUST

VC-1

C1
C2
C3
C4

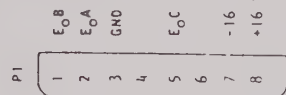
OCB-3

Bx2
B
Ax2
A

S1
S2

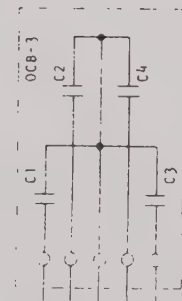
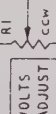
FREQ. RANGE

OSCILLATOR TO
AMPLIFIER CONNECTOR.
OUTPUT TO
DRIVER/S 0-9.2 VAC.

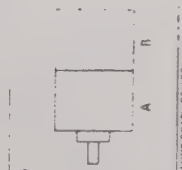


-16 VDC

+16 VDC



FREQ.	RANGE
1	10-20
2	20-30
3	30-40
4	40-50
5	50-60
6	60-70
7	70-80
8	80-90
9	90-100



Behlman Engineering

DRAWN BY		VH		APPROVED BY	
DATE		10/5/83		REVISED	
TITLE OSCILLATOR, WIRING DIAGRAM					
VARIABLE FREQUENCY, 4 BAND					
MODEL				DRAWING NO	
				8-1335/A	

PARTS LIST

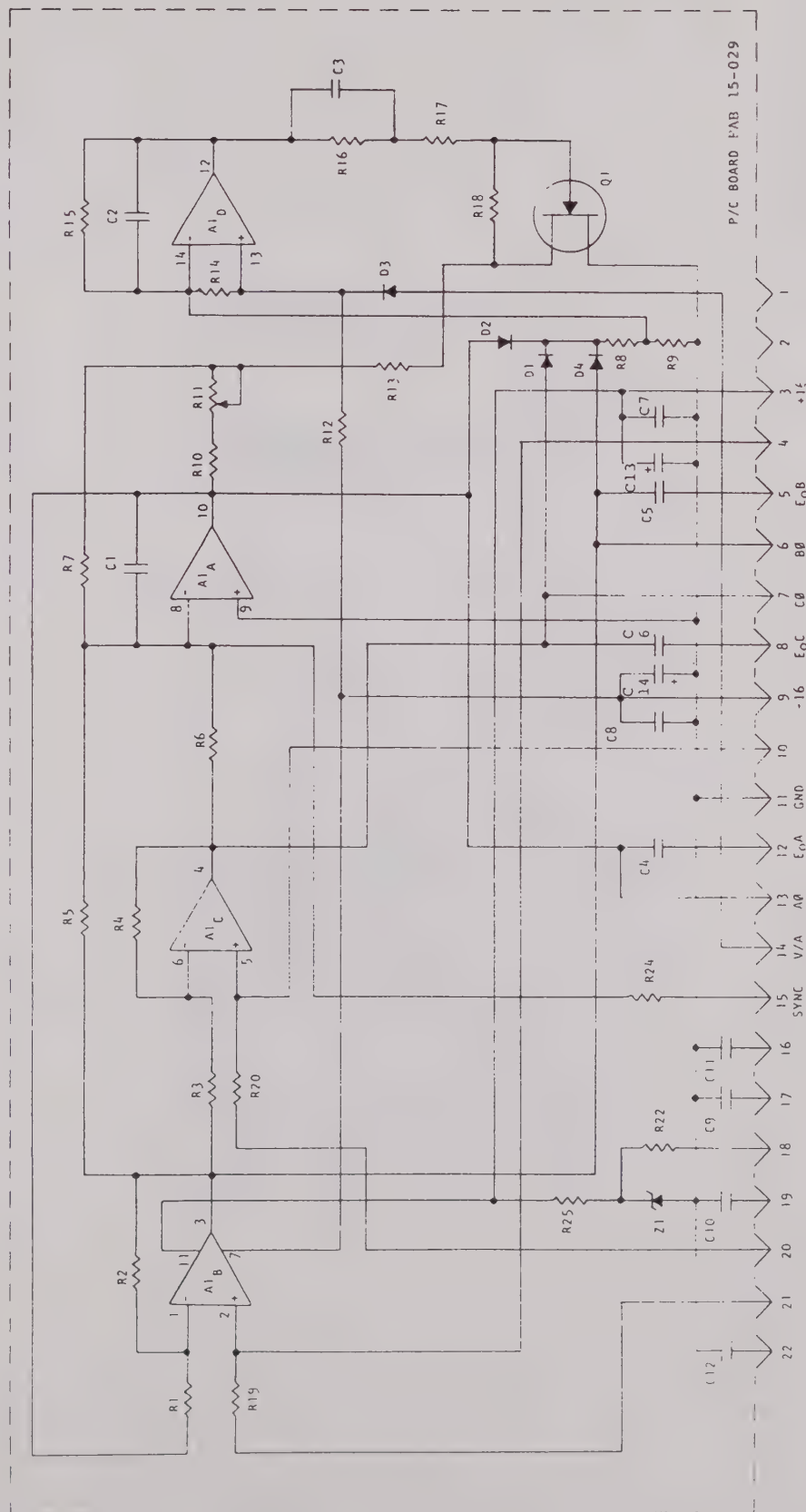
Description OSCILLATOR
WIRING DIAGRAM
Assembly/part no. _____
Drawing/ref no. B-1335/A

Model OSC- -45/2000-E
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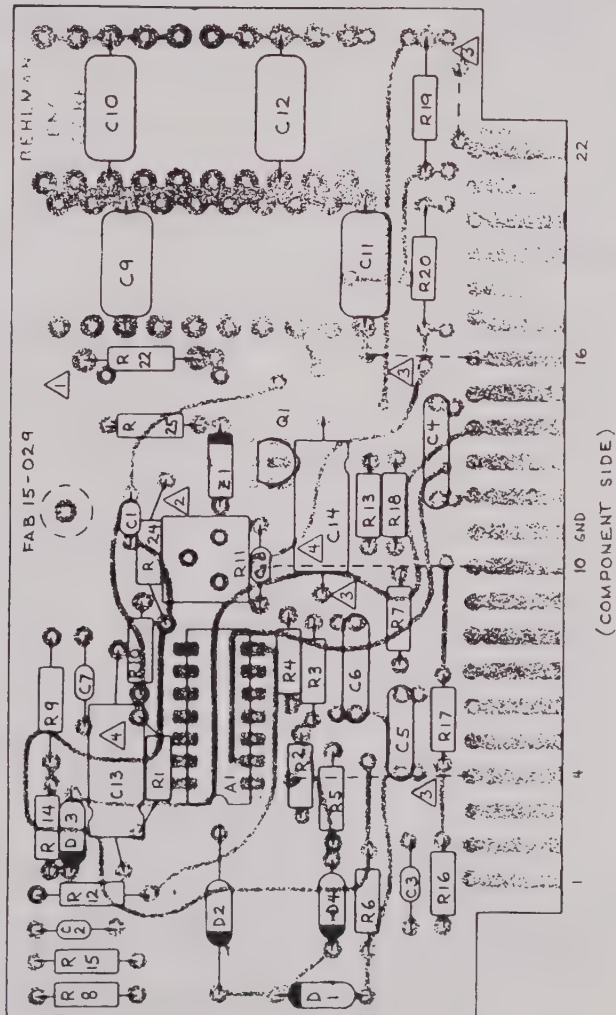
<u>REF.</u>	<u>DESCRIPTION</u>	<u>MANUFACTURER'S NUMBER</u>	<u>MANUFACTURER</u>
J1	P/C edge connector 22 contact	50-22A-20	TRW/Cinch
P1	Connector, Rack & panel Plug, 8 contact	26-4100-8P	Amphenol
R1	Potentiometer, Wirewound 10K, 2W, 10 turn	534-10K	Spectrol
R2	Potentiometer, Wirewound 50K, Dual-ganged, Single turn	302/Bushing/50K/50K	Spectrol
S1	Switch, Rotary 3 pole, 2-5 position Shorting	PA-2006	Centralab
1 pc	P/C assembly Oscillator Dwg. B-1324/A	16-148/A	Behlman Eng.

CAPACITOR ASSEMBLY:

C1-4	Capacitor, Polycarbonate Select at test (Frequency determining capacitors)		
1 pc	Printed circuit board	OCB-3	Behlman Eng.



S310N



- NOTES:
- 1 R22 SELECT AT TEST
 - 2 R24 USED ON EXT. SYNC. (-SW) MODELS ONLY.
 - 3 JUMPERS, NO. 26 AWG, TEFLON-SLEEVED, BACK SIDE (4 PLACES)
 - 4 C13, 14 USED ON DIGITAL FREQ. METER (DFM) MODELS ONLY.

Behlman Engineering		APPROVED BY	
SANTA BARBARA, CALIFORNIA		DATE 09-19-83	
DRAWN BY RJK		SCHEMATIC: B-1324/A	
TITLE COMPONENT LAYOUT, OSCILLATOR		VARIABLE FREQUENCY, MULTIBAND	
MODEL ASSY 16-148/A		DRAWING NO. B-1936/A	

PARTS LIST

Description OSCILLATOR
MULTI-BAND
Assembly/part no. 16-148/A
Drawing/ref no. B-1324/A, B-1336/A

Model _____

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<u>REF.</u>	<u>DESCRIPTION</u>	<u>MANUFACTURER'S NUMBER</u>	<u>MANUFACTURER</u>
A1	Quad operational amplifier	RC4136D	Raytheon
C1	Capacitor, Disk 39pF, 1000V	DD-390	Centralab
C2,3,7,8	Capacitor, Monolythic 0.1uF, 50V	SR205E104MAA	AVX
**C4-6	Capacitor, Monolythic 2.2uF, 50V	3C37Z5U225M050B	Sprague
C9,10	Capacitor, Mica Select at test (Frequency determining capacitors.)		
C11,12	Capacitor, Polycarbonate Select at test (Frequency determining capacitors.)		
C13,14	Capacitor, Electrolytic 10uF, 25V (Used as required)	TVA-1204	Sprague
D1-4	Diode, Signal 20mA, 100V	1N914A	Fairchild
Q1	Field effect transistor 10mA. 25V	2N3819	Siliconix
**R1-6	Resistor, Metal film 20K, 1/4W, 1%	RN55D 2002F	
R7,25	Resistor, Metal film 1K, 1/4W, 1%	RN55D 1001F	
R8	Resistor, Metal film 4.75K, 1/4W, 1%	RN55D 4751F	
R9	Resistor, Metal film 10M, 1/4W, 1%	RN55D 1005F	
R10	Resistor, Metal film 13.7K, 1/4W, 1%	RN55D 1372F	
R11	Potentiometer, Trimming 5K, 1/2W, 1 turn	72PR5K	Beckman

PARTS LIST

Description OSCILLATOR
MULTI-BAND
Assembly/part no. 16-148/A
Drawing/ref no. B-1324/A. B-1336/A

Model _____
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<u>REF.</u>	<u>DESCRIPTION</u>	<u>MANUFACTURER'S NUMBER</u>	<u>MANUFACTURER</u>
R12,14 17.18	Resistor, Metal film 100K, 1/4 W. 1%	RN55D 1003F	
R13	Resistor, Metal film 2.61K, 1/4 W, 1%	RN55D 2611F	
R15	Resistor, Metal film 1M, 1/4 W, 1%	RN55D 1004F	
R16	Resistor, Metal film 205K, 1/4 W, 1%	RN55D 2053F	
*R19,20	Resistor, Metal film 10K, 1/4 W. 1% Low TC type.	RN55C 1002F	
R21.23	Not used		
*R22	Resistor. Metal film 825 ohm, 1/4 W. 1%	RN55D 8250F	
R24	Resistor, Metal film 750K, 1/4 W. 1% (External sync models only)	RN55D 7503F	
Z1	Zener diode 14V, 1/2 W	1N5244	Motorola
1 pc	IC socket, 14 contact	14S-TSD	CA
1 pc	Printed circuit board	15-029	Behlman Eng.

* Nominal value, actual value may vary with application.

**C5,6 not used on 1Ø models. C6,R5 not used on 2Ø models.

BEHLMAN QUALITY PRODUCTS

Standard AC Power Sources

Single, two, and three-phase precision AC power sources are available with a selection of power outputs from 100 VA to 54 KVA and fixed or variable frequencies from 45 Hz to 10 kHz.

Programmable AC Power Sources

Laboratory quality AC power sources designed for precise local or remote control of output voltages, frequency, and phase relationships. All major remote programming inputs are accommodated including IEEE-488, binary, and DC voltage. Models range from 100 VA to 54 KVA in single, two, and three-phase configurations. Frequency ranges from 45 Hz to 10 kHz are standard.

Uninterruptible Power Systems

The ultimate solution to power disturbance problems. Reliability and excellence are engineered into every BEHLMAN UPS product. Models are available with power outputs from 100 VA to 7.5 KVA for single-phase models and from 3 KVA to 20 KVA for three-phase models. As with all Behlman products, these UPS generate virtually no EMI/RFI.

REPRESENTED BY:



BEHLMAN
Engineering

Electronic Energy Conversion Sources & Systems

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MP MASTER



MA29440